Space Weather Forecast

Issued on Wednesday, 26 July 2023 at 01:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Coronal Mass Ejection arrived 25 Jul, with G1/Minor storms likely day 1 (26 Jul). Chance R1/R2 blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Two Moderate flares were observed, and there are ten sunspot regions. The largest flare was from a relatively small region in the southeast disc, dominated by a larger central spot, surrounded by smaller less distinct ones, but leading to some moderate complexity. The other Moderate flare was a region in the northwest that has seen some significant growth, although it is becoming increasingly difficult to assess its complexity. The remaining regions remained stable or decayed slightly. No Earth-directed CMEs (coronal mass ejections) were observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: CME arrival occurred at 24/2153 UTC with solar winds speeds, increasing from background to become elevated, peaking at 560 km/s. Interplanetary magnetic field (IMF), was initially weak and but rose to Moderate, and close to Strong values briefly. The north-south component was variable and weak at first, but with the CME became highly variable, including some peaks of Moderately strong southward field (negative values). Geomagnetic activity was Quiet to Unsettled (Kp 1-3), but with a G1/Minor Storm interval observed 25/2100-2400 UTC with the CME arrival.

Energetic Particles / Solar Radiation: The observed count rate of high energy particles (high energy protons) increased in response to the far-sided large event on 24 Jul and continued to remain just above background on 25 Jul but declining. No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with a chance of isolated Moderate class flares.

Solar Wind / Geomagnetic Activity: CME arrival on 24/2153 UTC is potentially the very early arrival of a CME forecast to arrive later on day 1 or early day 2. This left the Sun on 23 Jul. There are other potential sources of the enhancement observed however, and so a further arrival later day 1 or early day 2 cannot be completely ruled out. Otherwise a weak enhancement from coronal hole sourced fast winds HSS may arrive day 3 into 4 (28-29 Jul) however this is low confidence. Ongoing CME effects are likely to give Active to G1 Minor Storm intervals at first day 1 (26 Jul). Any further enhancement will give a chance of further G1 Minor Storms. As CME influence recedes, likely during day 2 (27 Jul), mainly Quiet to Unsettled conditions are expected, rising again to Unsettled to Active, with a slight chance of G1 Minor Storms with any coronal hole enhancement day 3 or 4 (28-29 Jul).

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue declining towards background, although there remains a slight chance of the observed count rate increasing again from any significant flares that occur. Despite this, Solar Radiation storms are currently not expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	75	20	5	5
Strong	G3	No	5	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	50	40
Very Active	R3 to R5 X	No	10	10	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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